# Technological Hazards Profile

Technological hazards are those that are caused by tools, machines, and substances that are used every day. The major technological hazards that will be discussed in this section are Hazardous Materials and Radiological Accidents.

Hazardous Materials refers generally to hazardous substances, petroleum, natural gas, synthetic gas, and acutely toxic chemicals. The term Extremely Hazardous Substance (EHS) is used in Title III of the Superfund Amendments and Reauthorization Act of 1986 to refer to those chemicals that could cause serious health effects following short-term exposure from accidental releases.

With the passage of the Federal Emergency Planning and Community Right-To-Know Act (EPCRA) in 1986, the division began implementation of a statewide Hazardous Materials Emergency Planning Program. For the first time, passage of the Emergency Planning and Community Right-to-Know Act allowed emergency planners, responders, and the public access to facility-specific information regarding the identification, location, and quantity of particular hazardous materials t fixed sites.

The law requires facilities with threshold quantities of federally mandated substances to report annually to State and local emergency officials. In addition, facilities must immediately notify officials of any releases of harmful chemicals that have the potential to result in offsite consequences. This information is utilized to prepare emergency plans for hazardous materials incidents, to allow responders to receive training based on specific known threats, and to inform and educate the public regarding the chemicals present in their communities.

Utah has more than 4,500 fixed facility (2009) locations that report the presence of an Extremely Hazardous Substance in federally mandated threshold amounts. *(Utah DEQ, Environmental and Remediation Response)*

Currently, Utah does not have nuclear power generating facilities have the greatest concentration of radioactive. Other sources of radiological accidents can occur through transportation of radioactive material.

## Previous Occurrences

In 2009, approximately 212 incidents occurred in Utah, involving hazardous materials reported, according to the U.S. DOT's Pipeline and Hazardous Materials Safety Administration. Highway incidents account for 193 reported incidents. Utah ranked 42$^{nd}$ in number of incidents reported in 2009. The following table shows the year (2005-2009), number incidents, and the State's ranking. The number of events and the State's ranking has remained consistent since 2000.

Hazardous Materials Reports – Utah – 2005 - 2009

| *Year* | *Number of Incidents* | *State Ranking* |
|---|---|---|
| 2005 | 218 | 26th |
| 2006 | 312 | 24th |
| 2007 | 338 | 23rd |
| 2008 | 274 | 25th |
| 2009 | 212 | 42nd |

*http://www.phmsa.dot.gov/portal/site/PHMSA*.

## Current and Future Exposures

### Hazardous Materials

Major disasters like that in Bhopal, India, in December 1984, which resulted in 2,000 deaths and over 200,000 injuries, are rare. Reports of hazardous material spills and releases, however, are increasingly commonplace. Thousands of new chemicals are developed each year. Major chemicals spills can occur at any facility that produces, uses, or stores chemicals. These include chemical manifesting plants, laboratories, shipyards, railroad yards, warehouses, or chemical disposal areas. Illegal dumpsites can appear anywhere. Recent evidence shows that hazardous materials incidents may be the most significant threat facing local jurisdictions.

### Radiological Accidents

The transportation and disposal of radioactive materials and waste creates problems because of the long life of radioactive materials.

# Man-made Hazards Profile

Other manmade hazards are those hazards caused by direct human intervention and create a potential threat to the health, safety, and welfare of citizens. The major manmade hazards that will be discussed in this section are civil disturbances, mass immigration, and terrorism.

## Civil Disturbances

Civil disturbances are public crises that occur with or without warning and that may adversely impact significant portions of the population. These disturbances may be the actions of any number of persons causing disruption of the populace. .

## Mass Casualty Incidents

Mass Casualty Incidents occur as the result of injuries or death to numerous individuals at the same time. Examples include massive building structural failure, airplane crashes, or bus crashes, train derailments, and multiple collisions on interstate highways.

## Current and Future Exposure

Human-caused hazards can and do occur anywhere and at any time. In most cases they result in injuries, possible loss of life, and the threat of further violence or consequences. Because of the importance of international tourism and trade to the State's economy and central office of Church of Jesus Christ of Latter-Day Saints (LDS), the threats of manmade hazards will continue to exist. Local, State, and federal law enforcement officials continually monitor suspended terrorists and threats of mass immigration and civil disturbances.

## Terrorism

Terrorism is defined in the Code of Federal Regulations as "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives." It is the use of force or violence against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom.

If a terrorist incident occurs in a city or county, communities may receive assistance from both State and federal agencies under the existing Integrated Emergency Management System.
The Department of Homeland Security is the lead federal agency for supporting State and local response to the consequences of terrorist attacks. Terrorism is often categorized as "domestic" or "international."

- **Domestic terrorism** involves groups or individuals whose terrorist activities are directed at elements of our government or population without foreign direction.
- **International terrorism** involves groups or individuals whose terrorist activities are foreign-based and/or directed by countries or groups outside the United States or whose activities transcend national boundaries.

This distinction refers not to where the terrorist act takes place but rather to the origin of the individuals or groups responsible for it. For example, the 1995 bombing of the Murrah Federal Building in Oklahoma City was an act of domestic terrorism, but the attacks of September 2001 were international in nature.

For the purposes of consequence management, the origin of the perpetrator(s) is of less importance than the impacts of the attack on life and property; thus, the distinction between domestic and international terrorism is less relevant for the purposes of mitigation, preparedness, response, and recovery than for understanding the capabilities of terrorist groups and how to respond to the impacts they can generate.

Before the September 11, 2001, attacks in New York, the Pentagon, and Pennsylvania, most terrorist incidents in the United States had been bombing attacks, involving detonated and un-detonated explosive devices, tear gas, and pipe and fire bombs. The effects of terrorism can vary significantly from loss of life and injuries to property damage and disruptions in services such as electricity, water supply, public transportation, and communications. One way governments attempt to reduce vulnerability to terrorist incidents is by increasing security at airports and other public facilities that could be considered as targets.

While we can never predict what target a terrorist will choose, we do know some of the factors they use when selecting a target. Terrorists want to achieve one or more of the following:

- Produce a large number of victims
- Attack places that have a symbolic value
- Get the greatest possible media attention
- Produce mass panic

Terrorists also select targets best suited for the type of material being used. For example, some biological agents are not effective in sunlight. Most chemical agents are more effective indoors with limited airflow. A radioactive material will be most effective where large numbers of people will pass close by without detecting it. Terrorists are likely to target heavily populated, enclosed areas like stadiums, government buildings, sporting events, airport terminals, subways, shopping malls, and industrial manufacturing facilities.

A terrorist attack can take several forms, depending on the technological means available to the terrorist, the nature of the political issue motivating the attack, and the points of weakness of the terrorist's target. Other possibilities include an attack at transportation facilities, an attack against utilities or other public services, or an incident involving chemical or biological agents.

As a part of a terrorism risk assessment we can assume the results can be:

- Disrupt government and private industry operations and impact our economy and society
- Result in large-scale human casualties, property destruction, and damage to national prestige and public confidence

## Terrorism in Utah

As with most states, Utah considers itself to be vulnerable to terrorism because the chief objective of a terrorist is to spread fear and create economic damage.

The open availability of basic shelf-type chemicals and mail order biological research materials, coupled with access to even the crudest laboratory facilities, could enable the individual extremist or an organized terrorist faction to manufacture proven highly lethal substances or to fashion less sophisticated weapons of mass destruction. The use of such weapons could result in mass casualties and long-term contamination, and could wreak havoc to both the State and national economies.

International terrorism groups organized in Utah have not shown a specific desire to commit a violent act of terrorism but remain committed to fundraising and material support activities. Currently, there is no evidence to support the presence of sleeper cells in Utah . A significant threat may be manifested in the form of a “lone wolf”, inspired by geopolitical events, or influenced under a banner of international religious extremism. The likelihood of this occurring in low, the consequence would he high.

Unlike natural disasters, there are relatively few methods to predict the time or place of a Weapon of Mass Destruction (WMD)/terrorist event. This fact negates the "watch" and "warning" time phases. The action phases for a Weapon of Mass Destruction/Terrorist event will be Mitigation, Prevention, Response, and Recovery.

- Prevention Phase:
    - The actions during this phase are those taken by local, State, and federal law enforcement agencies to monitor and coordinate intelligence and other potential indicators to prevent, defend against, prepare for, and mitigate the impacts of terrorist attacks against our nation.
    - The State utilizes intelligence provided by Fusion Centers, Joint Terrorism Taskforces, and Regional Domestic Security Taskforces.

- Mitigation Phase:
    - The actions during this phase are those that require time to carry out. They include mitigation, training, planning, public awareness, and any activities that require long-term programs to accomplish their objectives.
    - These pre-disaster activities take place in the normal living and working environment of the participants.

- Response Phase:
    - The actions during this phase are those emergency response activities taken during the first 72 hours to a few weeks after the incident.
    - These actions are those taken immediately after an incident with the major goal of saving lives, alleviating suffering, and preventing further disaster.
    - When responding to disaster events, the National Incident Management System (NIMS) will be used by trained/qualified staff to manage the response actions.

- Recovery Phase:
    - The actions during this phase are those taken during the first one to two months after the incident.
    - These actions, which begin immediately after the emergency response operations, have the goal of returning the State and citizens to normal conditions.

- The emphasis will pass from life saving to cleanup of the affected areas and returning people to normal activities.

## Utah Department of Public Safety, Statewide Information and Analysis Center (SIAC)

Utah's Statewide Information & Analysis Center (SIAC) is a public safety partnership designed to appropriately collect, analyze, and disseminate intelligence to enhance the protection of Utah's citizens, communities, and critical infrastructure.

The SIAC is the state's intelligence fusion center: a collaborative effort of two or more agencies that provide resources, expertise and information for analysis, with the goal of maximizing their ability to detect, prevent, investigate, and respond to criminal and terrorist activity.

The SIAC has three major operational areas:

- Intelligence Analysis and Investigative Case Support
- The Intelligence Liaison Officer Program
- Critical Infrastructure Protection

The Utah SIAC keeps a list of State Critical Infrastructure and Key Resource (CI/KR) locations within the State that they determine to be a credible target of a terrorist event. The data and details of these structures cannot be provided within the mitigation plan due to the sensitivity of the data. Structures selected to the CI/KR list are eligible for additional government grant funding to increase their security against a terrorist event. One example of funding for which CI/KR sites qualify is the Buffer Zone Protection Program (BZPP).

## Critical Infrastructure Protection Program

The SIAC coordinates a local-level homeland security program – titled Asynchronous Critical Infrastructure Protection (ACIP) – that provides local law enforcement an independent ability to proactively protect their community's critical infrastructure. Through the ACIP program the SIAC collaborates with individual jurisdictions for enhancing their security posture as it pertains to Critical Infrastructure Protection (CIP).

The SIAC's Critical Infrastructure Protection program engages the law enforcement, public safety and private sector communities in partnerships to develop greater knowledge of Utah's risks, threats, and vulnerabilities. Furthermore, the SIAC seeks to coordinate with these stakeholders to better prepare, prevent, respond and recover from both man-made (criminal) and naturally occurring disastrous events.

Some of the SIAC's primary focus areas are as follows:

- Intelligence Analysis
- Investigative Case Support

- Risk and Threat Assessment
- Organized Crime &Gang Analysis
- Counter-Narcotics/Drug Trafficking
- Counter-Terrorism
- Homeland Security Risk Mitigation
- Fraud/Identity Theft Analysis
- Visual Analytic Presentation

Critical Infrastructure is defined as: systems and assets, whether physical or virtual, so vital to the State of Utah and the United States, that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national and state economic security, national and statewide public health or safety, or any combination of those matters. They may include, but not be limited to: telecommunications, transportation, energy, water, oil and gas and hazardous materials, emergency law enforcement services, agriculture and food, public heath, and mailing and shipping. Specific providers of these services are considered "sensitive" and not provided in this document.

Key resources are defined as: publicly or privately controlled resources essential to the minimal operations of the economy and government.

## Buffer Zone Protection Program

The Utah Statewide Information & Analysis Center (SIAC) is responsible for supporting the efforts of the U.S. Department of Homeland Security (DHS) to reduce the nation's vulnerability to terrorism and deny the use of U.S. Critical Infrastructure and Key Resources (CI/KR) as a weapon. In support of this objective, the The Utah Statewide Information & Analysis Center (SIAC) is developing, coordinating, integrating, and implementing plans and programs that identify, catalog, prioritize, and protect critical infrastructure in cooperation with all levels of government and partners in the private sector.

The purpose of the Buffer Zone Protection Program (BZPP) is to make it more difficult for terrorists to conduct planning activities or successfully launch attacks from the immediate vicinity of likely targets. The program is based on the premise that local law enforcement agencies and first responders are on the front lines preventing, defending against, preparing for, and mitigating the impacts of terrorist attacks against our nation.

## Weapons of Mass Destruction (WMD)

**Nuclear, Biological, and Chemical**

Weapons of mass destruction are defined as (1) Any destructive device as defined in 18 U.S.C., Section 2332a, which includes any explosive, incendiary, or poison gas, bomb, grenade, rocket having a propellant charge of more than four ounces, missile having an explosive or incendiary charge of more than one quarter ounce, mine or device similar to the above; (2)

Poison gas; (3) Any weapon involving a disease organism; or (4) Any weapon that is designed to release radiation or radioactivity at a level dangerous to human life.
Although bombs are still the weapon of choice for most terrorists, many are beginning to use nuclear, biological, and chemical weapons for their terrorist acts. The ways they spread these contaminants vary by the type used. For an attack on a wider area, terrorists may use crop dusting techniques or introduce the agent into the heat and air conditioning system of a building. They may use an explosive device, breaking device, or fan. The terrorist's goal is to reach the maximum number of people with the minimum amount of nuclear, biological, or chemical material.

## Weapons of Mass Destruction-Nuclear

Man-made radiation comes from medical devices, like x-ray machines, and also from nuclear power plants. There are low levels of radiation exposure present in the everyday environment, but the danger in a nuclear terrorist attack comes with the amount and type of radiation given off.

***Effects***

The effects of a nuclear attack depend on how much radiation is received, how long someone is exposed to the radiation, and how the radiation entered the body. For example, there would be a difference in the effects if someone drank radiation-contaminated water or if they were in the path of a nuclear explosion.

How radiation enters the body:

- Breathing it in.
- Swallowing contaminated food or water.
- Absorbed through the skin.
- Penetrating radiation that affects organs and blood.

***Symptoms***

Signs and symptoms of radiation exposure depend on the amount of radiation received and the length of exposure. Victims exposed to deadly or extremely high doses of radiation in a short period of time – seconds to minutes – will display symptoms you can recognize.

- Burned, reddened skin.
- Nausea, vomiting, diarrhea.
- Hair loss.
- Convulsions and unconsciousness.

Exposure to non-deadly doses may produce similar symptoms but may take longer to show up. Exposure to low doses of radiation will take 15 – 20 years for the medical effects, such as vision loss and cancer, to appear. Radiation also affects people differently depending on their age, gender, and overall health. Other health effects include:

- Brain swelling.
- Blood chemistry changes.

- Internal organ and tissue damage

***Indicators of a Nuclear Attack***

Nuclear attacks are very dangerous because radiation is invisible and odorless and requires special devices for detection. Unless a sign saying ―Radioactive is present or a nuclear explosion is witnessed, it is almost impossible to know that radiation is present or that people may have been exposed. Victims of this type of attack can often survive provided they are quickly decontaminated (washed or cleaned off) and medically treated as soon as possible.

## Weapons of Mass Destruction—Biological

Biological agents are actually living organisms or the products of living organisms and they can be deadly. Biological agents can go undetected for hours to days. Signs and symptoms might initially look like a bad cold, flu, or other common illness. Some agents can be extremely lethal in very small quantities. Biological weapons fall into three categories: bacteria, viruses, and toxins with bacteria. All three types can potentially be deadly.

***Effects***

Bacteria and viruses cause diseases such as anthrax, smallpox, and cholera. Toxins are poisonous products of living organisms. Examples include snake and scorpion venom and food poisoning, which are caused by a bacteria-produced toxin.

How biological agents enter the body:

- Breathing it in.
- Breaks in the skin.
- Injection.
- Eating or drinking

***Symptoms***

Signs and symptoms are different for each agent, and each agent will affect people differently. Young children, elderly, and chronically ill victims are more likely to be severely affected by these agents. Some common general symptoms may include:

- Coughing and flu-like symptoms.
- Shortness of breath.
- Weakness or fatigue.
- Vomiting.
- Diarrhea.

***Indicators of a Biological Attack***

Biological agents can take hours or days to produce an effect and make people sick. If the agent is contagious and the victims are experiencing flu symptoms, those people could infect others without even knowing they had been exposed. Victims can survive in most cases as long as they are identified in time and medically treated.

## Weapons of Mass Destruction—Chemical

Chemical warfare agents are substances specifically designed to kill, seriously injure, or disable people. They can be similar to many household chemicals such as insect killers, but are hundreds of times more hazardous. In general, terrorists use chemical agents because they are relatively easy and cheap to make. They work very fast – within minutes – and will cause mass injury, panic, and death using very small amounts. These agents were originally designed for military use as weapons of war. Their use in World War I and other combat situations proved their effectiveness. This effectiveness is what attracts terrorists.

***Effects***

Most chemical agents, depending on their type, concentration, and length of exposure, can be deadly. Some attack the central nervous system like nerve gas and incapacitating agents.
Some, such as blood and choking agents, attack the respiratory system. Blistering agents and riot control agents affect the skin, eyes, and mucous membranes by direct contact. Blister and riot control agents such as tear gas, mace, and pepper sprays can also affect the respiratory system.

Some of these chemical agents, with slight modifications, have industrial or commercial applications. For example, the same chlorine used to disinfect swimming pools was the first chemical warfare agent used in World War I as a choking agent.

How chemical agents enter the body:

- Breathing it in.
- Direct contact with skin and eyes.
- By eating or drinking.

***Symptoms***

Each chemical agent has different effects on people depending on the amount and duration of exposure, how it gets into the body, and its concentration. However, in general, people exposed to these chemical agents will share common physical signs and symptoms.

- Red or irritated eyes and skin.
- Choking and coughing.
- Shortness of breath or tightening of the chest.
- Vomiting and nausea.
- Runny nose.
- Dizziness or loss of consciousness.
- Convulsions or seizures.
- Pinpointed pupils and dimness of vision.

Unlike nuclear and biological materials, some chemical agents tend to cause symptoms in people in seconds to minutes. Some of these symptoms are similar to a heart attack or other illness. However, if you see several people in an area with the same signs and symptoms, it is highly unlikely that they are all having a heart attack. It is possible they have been exposed to a chemical agent.

## Previous Domestic Terrorism Occurrences

***Eco-Terrorism***

Eco-terrorism usually refers to acts of terrorism, violence or sabotage committed in support of ecological, environmental, or animal rights causes against persons or their property.

Under the Animal Enterprise Protection Act of 1992 it became a federal crime to "cause more than $10,000 in damage while engaged in "physical disruption to the functioning of an animal enterprise by intentionally stealing, damaging, or causing the loss of any property…used by the animal enterprise." In 2006, this was updated and renamed the Animal Enterprise Terrorism Act by the 109th congress. The updated act included causing personal harm and the losses incurred on "secondary targets" as well as adding to the penalties for these crimes.

In 2009 two animal rights activists arrested under the Animal Enterprise Terrorism Act in connection to the release of mink from Utah fur farms. The crimes are attributed to the Animal Liberation Front, which the FBI labels the "number one domestic terrorism threat."

## Probability of Future Terrorism Events

There is no sure way to predict future terrorism events. The probability of a major terrorist event in the State of Utah is perceived to be low, but planning must be done as part of the larger national Homeland Security initiatives. The Utah Statewide Information & Analysis Center (SIAC) and local government play a large role in providing the State with critical intelligence and serve as a prevention measure to the State.

# Other Hazard Vulnerability Analysis for State Facilities and Assets

In 2010 the SHMPAT provided the following details analyzing other hazards for vulnerability to State facilities and assets.

Utah recognizes that it is vulnerable to other hazards, such as terrorism and technological and man-made events. A high-level detailed risk assessment was not completed due to the low level of risk and lack of information for these compared to other hazards (earthquake and flood).

In a broad based analysis, the following state assets have been identified as potentially vulnerable to terrorism:

Water: such as lakes and reservoirs;
Dams (federal, state and privately owned
Canals and pipelines; and levees
Highways; airports, public roads; and bridges
Agriculture: farms
Finance: commercial banks; credit unions

Oil and Natural Gas: hazardous liquid pipelines; refineries and 1terminal facilities
Electrical Power: private and local power plants;
Chemical “high risk” facilities

**Assessing Vulnerability - Hazard**

| Hazard | Application Mode | Hazard Duration | Extent of Effects: Static/Dynamic | Mitigating and Exacerbating Conditions |
|---|---|---|---|---|
| Conventional Bomb | Detonation of explosive device on or near target; delivery via person, vehicle, or projectile | Instantaneous; additional secondary devices may be used lengthening the time duration of the hazard until the attack site is determined to be clear | Extent of damage is determined by type and quantity of explosive. Effects generally static other than cascading consequences, incremental structural failure, etc. | Energy decreases logarithmically as a function of distance from seat of blast. Terrain, forestation, structures, etc can provide shielding by absorbing and/or deflecting energy and debris. Exacerbating conditions include ease of access to target; lack of barriers/shielding poor construction; and ease of concealment of device. |
| Chemical Agent | Liquid/aerosol contaminants can be dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles/containers; or munitions | Chemical agents may pose viable threats for hours to weeks depending on the agent and the conditions in which it exists. | Contamination can be carried out of the initial target area by persons, vehicles, water, and wind. Chemicals may be corrosive or otherwise damaging over time if not remediated. | Air temperatures can affect evaporation of aerosols. Ground temperatures affects evaporation of liquids. Humidity can enlarge aerosol particles, reducing inhalation hazard. Precipitation can dilute and disperse agents but can disperse |

| | | | | |
|---|---|---|---|---|
| | | | | vapors but also cause target area to be dynamic. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects. |
| Biological Agent | Liquid or solid contaminants can be dispersed using sprayers/aerosol generators or by point or line sources such as munitions, covert deposits and moving sprayers. | Biological agents may pose viable threats for hours to years depending on the agent and the conditions in which it exists. | Depending on the agent used and the effectiveness with which it is deployed, contamination can be spread via wind and water. Infection can be spread via human or animal vectors. | Altitude of release above ground can affect dispersion; sunlight is destructive to many bacteria and viruses; light to moderate winds can break up aerosol clouds; the micro-meteorological effects of buildings and terrain can influence aerrosolization and travel of agents. |
| Radiological Agent | Radioactive contaminants can be dispersed using sprayers/aerosol generators, or by point of line sources such as munitions, covert deposits and moving sprayers. | Contaminants may remain hazardous for seconds to years depending on material used. | Initial effects will be localized to site of attack; depending on meteorological conditions, subsequent behavior or radioactive contaminants may be dynamic. | Duration of exposure, distance from source or radiation, and the amount of shielding between source and target determine exposure to radiation. |
| Nuclear Bomb | Detonation of | Light/heat flash | Initial light, heat, | Harmful effects |

| | | | | |
|---|---|---|---|---|
| | nuclear device underground, at the surface, in the air or at high altitude. | and blast/shock wave lasts for seconds; nuclear radiation and fallout hazards can persist for years. Electromagnetic pulse from a high-altitude detonation lasts for seconds and affects only unprotected electronic systems. | and blast effects of a subsurface, ground or air burst are static and are determined by the device's characteristics and employment; fallout of radioactive contaminants may be dynamic depending on meteorological conditions. | of radiation can be reduced by minimizing the time of exposure. Light, heat, and blast energy decreases logarithmically as a function of distance from seat of blast. Terrain, forestation, structures, etc. can provide shielding by absorbing an/or deflecting radiation and radioactive contaminants. |

## Hazard Analysis Matrix

The following technological and man-made hazard analysis matrix and technological and man-made consequence and impact analysis matrix show the vulnerability to a hazard. The matrix uses the risk factor and potential damage to equate the total vulnerability of a hazard.

To equate the risk factor (RF) the matrix uses the probability (P), frequency (F) and the severity (S) of the hazard in the formula of *(P/F)xS=RF*. To equate potential damage (PD) the matrix uses the formula *H+P+B=PD* where the vulnerability of Human (H), Property (P) and Business (B) are the variables. Potential damage is then divided by the risk factor to obtain the total vulnerability of a hazard allowing a consistent ranking of the hazards.

- Probability (P): The likely future occurrence of the hazard within a specified period of time
- Frequency (F): The record of previous occurrences of the hazard in the State
- Severity (S): The amount of likely damage, lives and property in the State
- Risk Factor (RF): The likely occurrence and damage of a hazard
- Human Vulnerability (H): Population likely to be affected by hazard
- Property Vulnerability (P): Property likely to be damaged by hazard
- Business Vulnerability (B): The likely impact of the hazard on economy
- Potential Damage (PD): The damage a hazard is likely to produce in the State
- Total Vulnerability (V): Risk Factor divided by Potential Damage

## Hazard Analysis Matrix

| Hazard | (P) | (F) | (S) | RF | (H) | (P) | (B) | (PD) | (V) |
|---|---|---|---|---|---|---|---|---|---|
| Cyber Attack | 4 | 3 | 3 | 4.00 | 1 | 4 | 4 | 9.00 | 44% |
| Building Fire | 3 | 3 | 3 | 3.00 | 2 | 4 | 4 | 10.0 | 30% |
| Agri-Terrorism | 1 | 2 | 3 | 1.50 | 2 | 2 | 2 | 6.00 | 25% |
| Workplace Violence | 3 | 2 | 2 | 3.00 | 3 | 1 | 4 | 8.00 | 38% |
| Health Hazard/Disease | 3 | 2 | 3 | 4.50 | 3 | 1 | 4 | 8.00 | 56% |
| HazMat Release | 3 | 4 | 2 | 1.50 | 3 | 3 | 2 | 8.00 | 19% |
| Bomb Threat | 2 | 1 | 1 | 2.00 | 1 | 1 | 2 | 4.00 | 50% |
| Terrorist Threat | 2 | 1 | 1 | 2.00 | 1 | 1 | 2 | 4.00 | 50% |
| Explosion | 1 | 1 | 5 | 5.00 | 5 | 5 | 5 | 15.00 | 33% |
| Public Safety Issues | 5 | 5 | 3 | 3.00 | 4 | 2 | 2 | 8.00 | 38% |
| Terrorist Event - WMD | 1 | 1 | 5 | 5.00 | 5 | 5 | 5 | 15.00 | 33% |
| Aircraft Accident | 1 | 1 | 5 | 5.00 | 4 | 5 | 5 | 14.00 | 36% |
| Civil Disturbance | 1 | 1 | 3 | 3.00 | 2 | 2 | 4 | 8.00 | 38% |
| Nuclear Attack | 1 | 1 | 5 | 5.00 | 5 | 5 | 5 | 15.00 | 33% |

| Scale | |
|---|---|
| Low | 1 |
| Below Average | 2 |
| Average | 3 |
| Above Average | 4 |
| High | 5 |

| Scale | |
|---|---|
| Low | 1 |
| Average | 2 |
| High | 3 |
| Extensive | 4 |
| Catastrophic | 5 |

## Hazard Consequence and Impact Analysis Matrix

Impact on Public

Based on the SHMP HIRA, there is neither record of a historical event or impacts as identified in the vulnerability analysis that would be considered catastrophic from a statewide perspective.

Historically hazard events in Utah tend to be small to moderate in size. In some instances, widespread flooding would be considered extremely significant. But, it would not necessarily rise to the level of catastrophic. A magnitude 7.0 earthquake along the Wasatch Front would be considered catastrophic.

Perhaps the hazard with the greatest impact on the public (in terms of numbers of individuals adversely affected statewide) would be an emerging disease/pandemic outbreak or a terrorism event that included a nuclear dispersion device.

Impact on Responders

Impact on responders was evaluated based on existing mutual aid and the ability to utilize the Emergency Management Assistance Compact (EMAC). Although there was an evaluation regarding the impact of responders as it relates to an emerging disease/pandemic outbreak or detonation of a nuclear explosion.

Continuity of Operations

Communities and the state continually develop and update their Continuity of Operations Plans (COOP) in the event facilities and/or agencies are impacted. State agencies also maintain disaster recovery plans which are largely IT focused. It is expected that affected agencies would exercise

their COOP as appropriate. Private sector businesses are encouraged to develop business continuity plans, but they are not mandated by the state.

Properties, Facilities and Infrastructure

The SHMP has attempted to collect and create risk assessments and vulnerability analyses for the different hazards it profiled. One must take into consideration when using the data that dollar damage and facilities affected as a state, regional or local property, facilities and infrastructure should be used independently and as a comparison. One cannot conclude that an entire region and or county would actually have an event occur where the maximum damages sustained are in all the counties in a region.

Environment

Certainly any hazard event has the potential for environmental impact. Flood events for example may result in pollution of streams and rivers due to combined sewage overflows and a tornado/wind event will disperse materials, trash and debris over a widespread area. A drought may affect the environment in a different way by drying up wetlands, and weakening/killing trees and forestlands. An earthquake and destroy and disrupt numerous parts of the environment and may take years to address and to recover. The four hazards that have a significant potential for environmental impact are: nuclear detonation/dispersion, emerging disease/pandemic outbreak, earthquake and flooding.

Economic

Because most hazards in Utah would not result in a statewide catastrophe, the economic impacts, while potentially severe, would be recoverable. Utah's economy continues to diversify. From a geographic perspective, an event that would affect the greater Salt Lake Valley would have a greater impact than would a hazard affecting other areas of the state. Similarly, an invasive species or pest that would affect a specific crop statewide, or a drought might result in a more widespread deterioration of the economic condition of the state. Finally, an event affecting Salt Lake City as it is the seat of state government could have a significant impact as centralized processing of payments to citizens for a variety of programs may be interrupted.

## Hazard Consequence and Impact Analysis Matrix

| Hazard | Frequency of Occurrence | Public | Responders | COOP | Delivery Services | Property, Facilities, Infrastructure | Environ-ment | Economics and Financial Conditions | Public Confidence in Governance |
|---|---|---|---|---|---|---|---|---|---|
| **Building Fire** | 3 | C | H | M | L | C | H | M | * |
| **Technological Man-made (Overall )** | 5 | C | C | E | E | E | H | E | * |
| **WMD** | 5 | H | H | H | H | H | H | H | * |
| **Cyber-Terrorism** | 1 | M | L | H | M | H | L | H | * |
| **Agri-Terrorism** | 5 | M | L | L | M | M | H | M | * |
| **HazMat Transportation** | 1 | H | H | M | H | H | H | M | * |
| **HazMat Fixed Sites** | 1 | H | H | M | H | H | H | H | * |
| **Civil Unrest** | 2 | M | M | M | M | M | M | H | * |
| **West Nile Virus** | 1 | H | | | | | | | * |
| **Influenza** | 5 | H | L | L | L | L | H | L | * |

| *Frequency of Occurrence: Numerical Value* | | *Vulnerability Factor: Numerical Value* | |
|---|---|---|---|
| Annual Event | 1 | Low | L |
| Every 5 years or less | 2 | Moderate | M |
| Every 10 years or less | 3 | High | H |
| Every 30 years or less | 4 | Extensive | E |
| Greater than 30 years | 5 | Catastrophic | C |

* The public confidence in the entity depends on how well the State works with local emergency managers and the public before, during and after an incident. The State of Utah Division of Homeland Security runs an Emergency Mangers email listserve that facilitates a strong viable working relationship between local emergency managers and UTDHS. The listserve is used as a way for emergency managers to ask questions, ask for assistance or to keep informed on going issues across the state. The State UTDHS also conducts training for locals in the four phases of emergency management, response, recovery, preparedness, and mitigation; UTDHS has received an increase of positive course feedbacks from training participants. An increase in the number of training participants is an indicator of the confidence locals have in the entity, UTDHS evaluates training needs assessment to meet the needs of the locals. UTDHS holds quarterly City, County, Directors Conference (CCDC) along with an annual Public Officials Conference (POC) both of which have had positive feedback in subject and content in helping lo

## 2010 Local Mitigation Strategy Integration – Technological and Manmade Hazards

The update to the State Hazard Mitigation Plan 2010 focused on evaluating statewide vulnerability for technological and manmade hazards. Regional hazard mitigation plans currently do not include technological or man-made hazards.

## Technological and Man-made Strategies

The SHMPT and our partners in the terrorism and response, worked together to develop strong, yet realistic, mitigation strategies for technological and man-made disasters. The effects of terrorism can vary significantly from loss of life and injuries to property damage and disruptions in services such as electricity, water supply, public transportation, and communications. In that respect, preparation for terrorist events is similar to any other disaster. Mitigation efforts for other hazards will also help to prevent damage from terrorist incidents as well. This "all-hazards" mitigation approach builds upon existing programs that mitigate other natural and technological

hazards while focusing on security of the public. With this "all-hazards" approach in mind, the State and communities can and should:

#1 Priority Goal: Recognize facility vulnerabilities throughout the State

A. Objective: *Establish ways to identify and fund structural mitigation measures*.

Possible projects:

1. Provide SIAC information and data supporting all-hazard mitigation efforts in for their assessment software
2. Encouraging tying into PDM funds to enhance structural mitigation measures on vulnerable State and local facilities.

Responsible agencies:

State government to identify structural mitigation measures

Local and State government to apply for grant opportunities

B. Objective: *Assess and enhance security measures at critical facilities*

Possible Projects:

1. All-hazard risk assessment information when updating security measures
2. Provide funding through Homeland Security grants to fund projects

Responsible agencies:

State government to identify structural mitigation measures

Local and State government to apply for grant opportunities

#2 Priority Goal**:** Reduce risk from bomb blast and nuclear, biological, and chemical attacks to critical state facilities and population.

A. Objective: *Review state and local technological manmade response and recovery plans*

Possible Projects:

1. Encourage local governments to review technological manmade hazards plans and include risk analysis and mitigation measures in their regional/local hazard mitigation plans.

Responsible agencies:

State government to identify mitigation measures

Local and State government to apply for grant opportunities

B. Objective: *Identify other plans and studies to assist with risk assessment*

Possible Projects:

1. Develop a secure technological and manmade library for plans
2. Work with private sector to gather risk assessment data.

Responsible agencies:

State government to identify plans

Local and State government to apply for grant opportunities

#3 Priority Goal: Enhance outreach and partnerships with state and local agencies

A. Objective: *Include non-traditional institutions, agencies, commissions, etc., that are impacted by technological and manmade hazard in state and local mitigation plan development*.

Possible Projects:

1. Include private sector representative on the State Hazard Mitigation Team
2. Include higher education on the State Hazard Mitigation Team

Responsible agencies:

State government to identify outreach and partnership opportunities

Local and State government to apply for grant opportunities

Possible funding will be evaluated at the local level with support from state and federal government programs.